CALFED

DRAFT TECHNICAL REPORT
AGRICULTURAL ECONOMICS
ENVIRONMENTAL IMPACTS

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1.0 Introduction

The intent of the CALFED Bay-Delta Program (Program) is to develop long-term solutions to problems affecting the San Francisco Bay/Sacramento-San Joaquin Delta estuary in Northern California. Overall, the effect of the Program is expected to be beneficial. However, specific Program components may have potentially adverse impacts.

The purpose of this technical report is to document, in a programmatic manner, the potential impacts of the Program on agricultural economics and production. The objective is to describe and analyze effects on agricultural economics and production that could result from the No Action Alternative or from implementing any of the three Program alternatives. This report discusses potential impacts that may occur in the five regions within the study area, including the Delta Region, Bay Region, Sacramento River Region, San Joaquin River Region, and other SWP Service Areas (outside the Central Valley). The report also contains a brief description of potential mitigation strategies designed to reduce Program impacts to a less-than-significant level. The executive summary contained in this technical report, in conjunction with other information, data, and modeling developed during pre-feasibility analysis, will be used to prepare the environmental impacts section of the Programmatic Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

Program components potentially affecting agricultural economics and production include all of the common programs (Ecosystem Restoration, Water Quality, Water Use Efficiency, and Levee System Integrity). In addition, the quantity, reliability, and cost of water provided by storage and conveyance components will affect agricultural users. The following assessment variables are used to describe potential impacts: irrigated acres, agricultural water use, costs and revenues from agricultural production, and risk and uncertainty.

2.0 Executive Summary

Potential impacts of Program alternatives are summarized by region in Table 1.

Delta Region

Direct impacts of the Ecosystem Restoration Program would be most felt in the Delta region. 120,000 to 150,000 acres out of production due to implementation of this program would result in a loss of gross revenue of up to $60 to $75 million per year. Some of this acreage and revenue would likely shift to other regions of the state, placing more demand on existing surface water and groundwater resources in those regions.

Additional land would be converted from agriculture to provide conveyance right-of-way, floodways, or additional habitat, depending on the alternative. Up to an additional 20,000 acres could be converted for these purposes.

Control of upstream drain water quality and quantity from implementation of the Water Quality component could reduce salinity of water diverted in the Delta for irrigation. Benefits could

Region	Existing Conditions	Alternatives					
		No Action	Alternative 1			Alternative 2	Alternative 3
			1a	1b	1c	2a - 2e	3a - 3i
Delta		Similar to Existing Conditions. Potential loss of islands to levee failure.	A,C	A,C	A,C	A,C	A,C
Bay		Similar to Existing Conditions. Higher cost and reduced supply to CVP users.	C	C	C	C	C
Sacramento River		Aggregate shift to orchards and vegetables. Higher cost and reduced supply to CVP users.	A,W,C	A,W,C	A,C	A,C	A,C
San Joaquin River		Aggregate shift to orchards and vegetables. Higher cost and reduced supply to CVP users.	A,W,C	A,W,C	A,C	A,C	A,C
Other SWP Service Areas		Similar to Existing Conditions. Aggregate conversion of land to urban use.	W,C	W,C	C	C	C

NOTES:

"A" indicates potentially significant negative impact on irrigated acreage. "W" indicates potentially significant negative impacts on water use. "C" indicates potentially significant negative impacts could result due to increased cost or declining revenue. "R" indicates potentially significant impacts could result from increased risk or uncertainty.

For alternatives with additional water supply, this significance table assumes that agriculture is willing to purchase its portion of that supply. If that is not the case, then the potential water supply impacts indicated in Alternatives 1A and 1B would also apply to the other alternatives.

Table 1. Summary of Potentially Significant Impacts by Alternative and Region

include reduced costs, higher yields, and more flexible crop selection. Water quality best management practices (BMPs), if applied to Delta agriculture, could raise production costs.

The Levee System Integrity Program would benefit Delta agriculture by providing greater protection from inundation and salinity intrusion. Setback levees would require the purchase and conversion of mostly agricultural lands.

Impacts of Storage and Conveyance components would largely be conversion of Delta land for right-of-way or in-Delta storage. Conversion would generally require less than 10,000 acres, but the chain-of-lakes alternative could inundate up to 80,000 acres. Relatively small irrigated areas within the Delta could benefit from the improved water supply and reliability.

Potential charges imposed on agricultural water use to recover costs of Program components could lead to significant changes in agricultural activities (e.g., crop selection, water use). Cost recovery policies are not defined at this time.

Sacramento River Region

Common program impacts could include some lands converted for habitat and other lands idled as a result of water purchased for instream flow. Up to 50,000 acres could be idled for these purposes. Costs of BMPs for the Water Quality and Water Use Efficiency Programs could be significant.

Impacts from improvements in water supply reliability are small. Additional water supply could range up to about 35,000 acre-feet (AF) on average. Potential beneficiaries would be primarily CVP contractors. It is unclear whether these potential users would be willing to pay much for additional water.

San Joaquin River Region

Common program impacts could include some lands converted for habitat and other lands idled as a result of water purchased for instream flow. Up to 50,000 acres could be idled for these purposes. Costs of BMPs for the Water Quality and Water Use Efficiency Programs could be significant.

Impacts from improvements in agricultural water supply and reliability would potentially be most felt in areas of the San Joaquin Valley receiving water exported from the Delta. The range and nature of the impacts depend on the degree of change in water supply and on the cost. Assuming that agricultural users are willing to pay for it, additional yield available for agricultural use could range from none in Alternatives 1A and 1B to about 180,000 AF per year in some Alternative 3 configurations. Based on previous studies, it is expected that this water would be used partly to reduce annual groundwater overdraft and partly to support production on lands idled due to supply restrictions of the Central Valley Project Improvement Act (CVPIA), the Bay-Delta Accord, and Biological Opinions.

Potential charges imposed on agricultural water use to recover costs of Program components could lead to significant changes in agricultural activities (e.g., crop selection, water use). Cost recovery policies are not defined at this time.

Bay Region

Impacts on agriculture in the Bay Region are expected to be small, although specific areas will be affected. Potential cost impacts from the Water Quality and Water Use Efficiency Programs may occur if BMPs are applied to areas outside the Central Valley. The San Felipe Division of the Central Valley Project (CVP), agriculture served by the North Bay and South Bay aqueducts, and agriculture served by Contra Costa Water District (CCWD) are the users with potential impacts.

Potential charges imposed on agricultural water use to recover costs of Program components could lead to significant changes in agricultural activities (e.g., crop selection, water use). Cost recovery policies are not defined at this time.

Other SWP Service Areas

Impacts on agriculture in this region are expected to be small. Potential cost impacts from the Water Quality and Water Use Efficiency Programs may occur if BMPs are applied to areas outside the Central Valley.

Potential charges imposed on agricultural water use to recover costs of Program components could lead to significant changes in agricultural activities (e.g., crop selection, water use). Cost recovery policies are not defined at this time.

Substantial conversion of agricultural land in the Delta Region could shift some production to desert areas in Southern California.

3.0 Assessment Methods

Each of the major categories of Program component could potentially affect agricultural economics and production. This section describes the primary ways in which Program components could potentially lead to impacts, and then describes the approaches used to assess those impacts qualitatively and quantitatively.

3.1 Potential Impact Mechanisms

The primary impact mechanisms of the Program components are expected to be:

Ecosystem Restoration Program: the cost of installing or replacing fish screens, fish ladders, and other devices; the conversion of agricultural land for habitat; the idling of land due to purchase of water for instream flow; and impacts associated with the shift of agricultural production from the directly affected lands to other regions of the state.

Water Quality Program: costs associated with implementing BMPs to control water quality and benefits to downstream agricultural users of lower salinity or other constitu-ents in upstream return flows.

Water Use Efficiency Program: costs associated with meeting water use efficiency goals or BMPs. Reduced percolation (recharge) to groundwater and surface return flows can adversely affect third-party water users; and reduction of irrecoverable losses can provide water for other uses. Shifting to pressurized irrigation can induce greater groundwater use because it is available on demand and is free of silt and debris that can clog emitters. Some evidence exists that yields can improve with more careful and efficient water management. Facilitation of water transfers can provide large financial benefits to both willing buyers and willing sellers, but may cause significant impacts to agricultural labor and suppliers. If groundwater is pumped to replace surface water sold, long-term impacts on groundwater levels and quality can be significant. If pumping occurs in hydraulic connection

with a surface stream, streamflow can be reduced.

Levee System Integrity Program: reduced risk of inundation of lands directly protected by levees; reduced risk of salinity intrusion into water delivery systems; and conversion of agricultural lands to floodways, setback levees, or other flood control uses.

Storage and Conveyance Programs: conversion of agricultural lands needed to build the structures; changes in the quantity or reliability of water available for agricultural use.

All Programs: charges assessed on agriculture to recover costs of the overall Program, including charges imposed per AF of water provided by new storage and conveyance; and benefits of reduced uncertainty that results from resolution of Bay-Delta issues.

3.2 Approaches for Assessing Potential Impacts

At this stage of the analysis, potential impacts are discussed qualitatively for the alternatives. Each configuration (e.g., 1A, 1B) is evaluated as part of an alternative. All of the potential impacts described are based on review of and experience with other studies.

As estimates of water supply changes, land conversion, and costs are available (and as time permits), quantitative estimates of some impacts may be made. These will be made using existing policy-level models, such as the Central Valley Production Model, and by interpolation or extrapolation of estimates made in other studies.

The potential impacts described below have not been specified as relative to No Action versus existing conditions. In general, the same direction of impact would occur regardless of the basis for comparison, only the magnitude of impact would change. Because magnitudes are difficult to assess at this stage, no differentiation was attempted.

4.0 Significance Criteria

Assessment variables for agricultural impacts are irrigated acres, agricultural water use, costs and revenues from agricultural produc-tion, and risk and uncertainty. Criteria used to judge whether an impact in each of these categories is potentially significant are described below. Significance criteria are applied only to negative impacts.

Irrigated Acres

Permanent or long-term reduction in acres exceeding 5 percent of irrigated land within a region would be considered significant. Reductions include both permanent conversion or retirement of the land and increased fallowing of land due, for example, to long-term reduction in water supply. Changes of this magnitude are easily within historical variations due to weather, water supply, and farm programs, and are not judged likely to cause large disruptions in labor, input, and product markets.

Any permanent conversion of lands categorized as prime or unique farmlands would be considered significant.

Agricultural Water Use

Any increase in groundwater pumping that would cause or exacerbate overdraft of a basin would be considered significant. A change in surface water use could be significant if it leads to changes in land use or regional employment that are judged to be significant.

Production Costs and Revenues

Changes in costs and revenues would not, in themselves, be considered significant environmental impacts. However, changes

in costs or revenues could change the economics of farming to an extent that land use, water use, and employment could be affected.

Risk and Uncertainty

No objective or numerical thresholds have been identified for judging the significance of changes in risk or uncertainty of agricultural production. Negative impacts may be judged potentially significant if they have the poten-tial for affecting agricultural land use and water use decisions.

Regional Income and Employment

See the Regional Economics Environmental Impacts Technical Report.

5.0 Environmental Impacts

5.1 Description of No Action Resource Conditions

The key changes between existing conditions and the No Action conditions that will affect agricultural production are: changes in the markets for agricultural products, the supply and reliability of irrigation water, the development of water transfer markets, and the cost of water.

According to estimates in DWR's Bulletin 160-93 (DWR, 1994), future market conditions for California agricultural products will reflect a continuation of current trends. Increasing demand for fruits and vegetables will result in a shift toward production of these commodities, and away from field crops and grains. Table 2 compares the existing condition mix of crops in the three Central Valley regions with that projected for the year 2020 in DWR's Bulletin 160-93. Similar trends are projected for agricultural regions outside the Central Valley.

Since the publication of DWR's Bulletin 160-93 (DWR, 1994), several important changes have occurred to water supply conditions for agriculture. The CVPIA was passed in 1992, which reallocated substantial amounts of CVP water away from agricultural use and for environmental restoration. As much as 1.2 million AF (MAF) per year could have been reallocated, but current estimates have shown that hydrologic and regulatory conditions result in substantially less water being reallocated. In addition, the 1994 Bay-Delta Accord resulted in the State Water Project (SWP) and CVP reducing the amount of water pumped from the Delta and delivered for agricultural and municipal uses. Estimates vary of the total impact of these two changes, but it could be as high as 1 MAF less water delivered on average to agriculture. This reduction is borne primarily in regions served by Delta export pumping and, to a lesser extent, by CVP water service contractors in the Sacramento River Region.

Table 3 summarizes the agricultural water use in the Central Valley before and after implementation of water reallocation due to The CVPIA. This table provides a sense of how much a change in surface water delivery trades off with a corresponding change in groundwater pumping. These estimates, prepared for the CVPIA Programmatic EIS, indicate that part of any change in surface water delivery is likely to be offset be a change in groundwater use. The degree of replacement depends on the relative cost of groundwater and surface water, and on the relative cost and benefit of other potential adjustments (e.g., changing acreage irrigated or changing irrigation method).

It is widely held that water transfers will play an increasing role in future allocation and use of water. The CVPIA and a number of state laws have increased the likelihood of transfers in the future.. Because of the uncertainty and speculation involved,

Crop	Delta Region		Sacramento River Region		San Joaquin River Region	
	Existing Condition	No Action Condition	Existing Condition	No Action Condition	Existing Condition	No Action Condition
Pasture	25.1	24.5	188.4	162.3	183.8	132.4
Alfalfa	44.1	43.7	105.9	96.7	427.4	342.4
Sugarbeets	28.6	28.6	78.2	69.6	57.3	42.8
Other field	114.8	114.8	207.4	224.0	366.3	369.4
Rice	0.9	0.9	473.1	472.1	18.7	13.5
Truck crops	46.0	46.0	45.3	84.4	368.3	490.7
Tomatoes	42.4	42.4	118.3	130.1	145.8	127.7
Deciduous orchards	21.3	21.3	313.9	346.7	692.4	715.7
Grains	96.7	96.8	282.0	232.9	236.7	210.6
Grapes	5.8	5.8	29.7	37.4	539.1	517.0
Cotton	0.0	0.0	0.0	0.0	1062.5	1082.1
Subtropical orchards	0	0	14	14	199	199
Total	**426**	**424.8**	**1,856**	**1,870**	**4,297**	**4,243**

NOTE:

Acreages are based on estimates from the Draft Programmatic EIS of the CVPIA. The existing condition estimates assume that the Bay-Delta Accord is in place. The No Action estimates are for Alternative 1 of the CVPIA PEIS.

Table 2. Irrigated Acres in the Central Valley (thousand acres)

Source	No Action Condition without CVPIA	Change due to CVPIA Dedicated Water for Restoration
Sacramento River Region		
Surface water	4,524	-39
Groundwater	2,603	25
Total applied	7,127	-14
San Joaquin River Region		
Surface water	4,453	-302
Groundwater	3,427	134
Total applied	7,880	-168

NOTE:

These estimates are based on regions as defined in the CVPIA PEIS and are shown as an example, based on estimates for the PEIS Alternative 1.

Table 3. Substitution of Groundwater for Surface Water—Example before and after CVPIA Reallocation of Water (thousand AF/yr)

however, water transfers have been excluded from this description of No Action conditions. The Programmatic EIS for the CVPIA (currently in Administrative Draft) will describe a potential scenario for movements and prices of water in a transfer market under conditions similar to the No Action Alternative.

Another important change in agricultural water supply between the early 1990s and the 2020 No Action conditions is an increase in the cost of water, especially to CVP users. Implementation of cost-of-service and tiered water pricing, plus the restoration charges and surcharges imposed by The CVPIA, will increase the cost of water by up to 100% in some CVP service areas. Also, districts looking for water to transfer are almost certain to spend more for that water than they have in the past.

Key differences between the existing conditions and the 2020 No Action conditions for each impact region are summarized below.

5.1.1 Delta Region

Little change in crop mix or total irrigated acreage is expected. Some acreage may be lost temporarily due to levee failure. Depending on repair and reclamation costs, some of this land could be lost permanently. Delta water quality may decline compared to existing conditions (see Water Quality Environmental Impacts Technical Report), imposing additional costs on Delta agriculture.

5.1.2 Sacramento River Region

Based on projections provided in DWR's Bulletin 160-93 (DWR, 1994), acreage of pasture, hay, and grains will decline; and

acreage of orchards and truck crops will increase. Overall irrigated acreage will remain similar. Implementation of The CVPIA will reduce surface water delivery and increase costs in some parts of this region.

5.1.3 San Joaquin River Region

Irrigated acreage will decline slightly, with orchards and truck crops increasing, and pasture and hay declining. Implementation of The CVPIA will significantly reduce surface water delivery and increase costs in parts of this region supplied by CVP water. Addi-tional salinity of water diverted from the Delta could impose additional salt management costs (see Water Quality Environmental Impacts Technical Report).

5.1.4 Bay Region

The major change between the existing condition and 2020 No Action condition is the reduction in supply and increased cost of CVP water due to CVPIA implementation. The San Felipe Division in Santa Clara and San Benito counties is primarily affected.

5.1.5 Other SWP Service Areas

Agricultural acreage in this region will decline primarily due to urbanization. Agricultural land served only by SWP water is relatively small.

5.2 Description of Alternative Resource Conditions

5.2.1 Delta Region

Alternative 1

The **Ecosystem Restoration Program** recommends that a total of approximately 120,000 to 150,000 acres of land in the Delta Region be converted to habitat and ecosystem restoration, levee setbacks, and floodways. The great majority of this land is likely to be used currently for agricultural purposes. Based on the current mix of crops grown in the Delta, crops removed from production are likely to be corn, hay and pasture, other field crops, and grains. Some vegetables and orchards may also be removed, depending on the location of converted lands. Using corn and alfalfa as example crops likely to be affected, the annual reduction in gross revenue from production would be from $60 to $75 million.

Because the market demand for these crops will still exist, some acreage will likely be shifted to other regions in the Central Valley or elsewhere. Under Alternatives 1A and 1B, no new water is developed for agriculture; therefore, the crops shifted to other areas of the state could increase the use and overdraft of groundwater. Alternative 1C could provide up to 200,000 AF of water for agriculture on average. Assuming that the cost of this water is affordable for crop production, it could be used to irrigated crops shifted due to Delta land conversion.

Reduced acreage and higher production costs in other regions would result in some increase in prices to consumers. The amount of the increase depends on the market conditions for each crop. Additional costs of installing or replacing screens on Delta diversions may be borne by agricultural water users.

The **Water Quality Program** may implement BMPs that regulate the quantity or quality of discharged drainage from agricultural lands. Impacts will vary depending on structure of control program (e.g., whether BMPs are required versus advisory, or whether financial incentives such as cost-sharing and technical assistance are provided). BMPs could include practices such as reuse of surface drain water, percolation and subsurface drainage control, recycling, treatment, and controlled

discharge of drainage. Effective reduction in salinity of water entering the Delta and delivered to agriculture is a potential benefit. Lower salinity reduces the costs of managing salt accumulation, can improve crop yield, and can allow a wider selection of crops.

Costs of implementing BMPs to improve discharge from Delta crop land is a potential impact to Delta agriculture.

Potential impacts of the **Water Use Efficiency Program** on agriculture in the Delta are difficult to assess because they depend on the details of Program implementation, which will largely occur at the local level. The Program does not impose mandatory measures and targets, but rather relies on incentives and technical assistance. The Program includes policies on agricultural water use efficiency and water transfers.

Achieving higher agricultural water use efficiency requires costs at both the farm and district levels. Greater capital investment and energy use is generally required to deliver and apply water more precisely and on demand. Some evidence exists that yields can improve with more careful and efficient water management. Costs for water and other production inputs can also change. The impact of the Water Use Efficiency Program is uncertain, and could range from little or no measurable effect to significant reductions in applied water. Because nearly all of the return flow from Delta irrigation is reusable, net effects on the volume of available water supply would be small. Costs of achieving efficiency increases could range from $35 to $50 per AF of reduced applied water, but over $300 per AF of net savings in consumptive use or irrecoverable loss (i.e., "real" water savings).

Potential impacts of the **Levee System Integrity Program** on agriculture in the Delta include:

- Improvement in the reliability of protection from a levee provides a reduced risk of flooding to agricultural areas protected. Potential impacts are described in the Flood Control Economics Technical Report.
- Setback levees would largely require the purchase of existing agricultural land. Crop acreage and production would decline, with potential impacts similar to those described under the Ecosystem Restoration Program.
- Salinity intrusion that might result from key levee failures could cause extended shutdown of Delta water diversions. Impacts would be greater on the western Delta islands, and would affect all crops requiring irrigation during the salinity intrusion period.

Alternatives 1A and 1B do not include **Storage or Conveyance Components.** Alternative 1C includes some enlarged Delta channel capacity, plus potential surface and groundwater storage. Additional SWP and CVP yield and reliability from these components are not expected to have large water quantity impacts on Delta agriculture. Potentially up to 2,500 AF/yr on average would be available to CVP service areas in the Delta (primarily CCWD and the northernmost districts in the Delta Mendota Service Area). Table 4 shows estimates of additional water available by region.

Alternative 2

Potential impacts from the common programs on agriculture in the Delta are expected to be similar to those described under Alternative 1.

The major difference between Alternatives 1 and 2 is in the **Storage and Conveyance Components**. Channel widening and island flooding will require the purchase and conversion of Delta agricultural lands, with the cropping pattern on purchased land similar to that described in the Ecosystem Restoration Program under Alternative 1.

Alternative 2A would require the purchase of a 500-foot strip of land along about 30 miles of the Mokelumne River. This is about 2,000 acres, most of which is in agricultural use. An additional 2,000 to 3,000 acres of adjacent existing agricultural land also would be inundated.

Alternative 2B would implement the same Delta modifications described under Alterna-tive 2A, and would add surface water and groundwater storage components. The storage components are not expected to have an impact on agricultural water use, acreage, or production costs in the Delta.

Instead of a Hood intake, Alternative 2C would construct three intake locations for diversion of water into the Tracy and Banks Pumping Plants. Agricul-tural land would be purchased and converted for conveyance. Additional land would be purchased and inundated, resulting in the conversion of existing agricultural land. The amount of land purchased would depend on the location and method of conveyance, but could be as much as 10,000 acres.

Impacts of Alternative 2D would be similar to those described for Alternative 2A, except that up to an additional 10,000 acres of agricultural land would be purchased and converted to floodway, conveyance channel, or habitat.

Alternative 2E eliminates in-channel conveyance from Hood to the Mokelumne River, and adds additional habitat from the inundation of an existing island. Total agricultural land converted for these conveyance features could range up to 20,000 acres.

For all configurations of Alternative 2, agricultural water use and crop revenue in the Delta would change in the same direction as acres in production. Reductions in gross and net revenue are generally not as large as reductions in acreage, because the less profitable crops are dropped from produc-tion. Impacts of water supply increases within the Delta Region would be small, up to levels similar to those described under Alternative 1C.

Alternative 3

Potential impacts from the common programs on agriculture in the Delta are expected to be similar to those described under Alternative 1.

The major difference between Alternatives 1 and 3 is in the **Storage and Conveyance Components**. Additional water supply or increased reliability provided by the storage components is not expected to affect the Delta Region significantly. A few districts delivering water from Delta export facilities, such as CCWD and Banta Carbona Irrigation District, provide irrigation water within the Delta Region. Water supply and reliability impacts on these users from storage and conveyance components would be similar to those described for the San Joaquin River Region. Potential impacts in the Delta Region would be caused by displacement of agricultural land by the construction of the storage or conveyance facilities.

Impacts of Alternative 3A are similar to Alternative 2A, except there would be no planned flooding of existing islands. In addition, the open channel conveyance facility will require the purchase and conversion of a 2,000-foot-wide alignment

Alternative	DWRSIM Study	Total Yield Increase (1,000 AF)		Agricultural Yield Increase (1,000 AF)		Assumed Percent Delivered by Region				
		Critical	Average	Critical	Average	Delta (1%)	Bay (2%)	Sac. (17%)	S.J. (81%)	Other (0%)
1A	472	0	0	0	0	0.0	0.0	0.0	0.0	0.0
1B	472	0	0	0	0	0.0	0.0	0.0	0.0	0.0
1C	510	751	623	250	207	2.5	3.2	34.6	166.7	0.0
2A	472B	80	180	27	60	0.7	0.9	10.0	48.3	0.0
2B	510	751	623	250	207	2.5	3.2	34.6	166.7	0.0
2C	472B	80	180	27	60	0.7	0.9	10.0	48.3	0.0
2D	498	370	320	123	107	1.3	1.7	17.9	86.1	0.0
2E	510	751	623	250	207	2.5	3.2	34.6	166.7	0.0
3A	475	210	270	70	90	1.1	1.4	15.0	72.5	0.0
3B	500	1070	660	356	220	2.6	3.5	36.7	177.2	0.0
3C	475	210	270	70	90	1.1	1.4	15.0	72.5	0.0
3D-3I	500	1070	660	356	220	2.6	3.5	36.7	177.2	0.0

Table 4. Assumed Additional Yield Delivered for Irrigation by Region and Alternative

for the canal. For a 50-mile canal, about 12,000 acres would be purchased. Because some of that right-of-way could potentially be farmed, total agricultural land converted could range from 5,000 to 10,000 acres.

Potential impacts of Alternative 3B are similar to those described for Alternative 3A, except that up to 200,000 AF of in-Delta storage would require conversion of from 10,000 to 15,000 existing lands. Delta impacts from Alternatives 3E and 3G are similar to those for Alternative 3B.

Alternative 3C impacts are similar to those described for Alternative 3A, except that a pipeline would require potentially less land conversion than an open canal.

Alternative 3D impacts are similar to those described for Alternative 3B, except that a pipeline would require potentially less land conversion than an open canal.

Alternative 3F is similar to Alternative 3B, except that a chain of inundated Delta islands would provide conveyance rather than a canal. From 50,000 to 80,000 acres of additional Delta agricultural land would be converted to storage and conveyance.

Alternative 3H is similar to Alternative 2E, but with additional agricultural land purchased for right-of-way for the conveyance canal.

Impacts of Alternative 3I in the Delta Region are similar to those described under Alternative 2C. Some additional land would be purchased for right-of-way.

For all configurations of Alternative 3, agricultural water use and crop revenue in the Delta would change in the same direction as acres in production. Reductions in gross and net revenue are generally not as large as reductions in acreage, because the less profitable crops are dropped from production. Impacts of water supply increases within the Delta Region would be small, similar to or less than those described under Alternative 1.

Impacts in the Delta Region are summarized in Table 5.

5.2.2 Sacramento River Region

Alternative 1

Alternative 1A includes only the common program components.

The **Ecosystem Restoration Program** includes some purchase and conversion of agricultural lands for habitat restoration in the Sacramento River Region. In addition, some water may be acquired from existing users in the region to augment river flow and Delta outflow. Assuming that water acquired would not be replaced with groundwater pumping, the total effect of these components could be the conversion or idling of up to 50,000 acres of agricultural land, primarily lands on the east side and valley trough. Typical crops grown include rice, pasture, hay, orchards, and tomatoes.

The **Water Quality Program** may implement BMPs that regulate the quantity or quality of discharged drainage from agricultural lands. Costs of implementing BMPs are unknown at this time, but large potential costs in the Sacramento Valley could include reducing surface drain water volume or improving its quality. Depending on costs and options for cost-sharing, the impacts on agricultural production costs in the Sacramento River Region are potentially significant.

Potential impacts of the **Water Use Efficiency Program** on agriculture in the region are difficult to assess because they depend on the details of Program implementation, which will largely occur at the local level. Achieving higher agricultural water

Assessment Variable	Existing Conditions	Alternatives									
			Alternative 1		Alternative 2		Alternative 3				
		No Action	1a-1b	1c	2a, 2c, 2d	2b, 2e	3a, 3c	3b, 3d, 3e,3g	3f	3h	3i
Irrigated Acres		Potential loss of islands to levee failure.	120-150 thousand acres converted to other uses.	Same as Alternative 1a	Same as Alternative 1a, plus additional 2,000-10,000 acres converted	Same as Alternative 2a, except Alternative 2e could convert up to 20,000 acres for conveyance	Same as Alternative 1a, plus additional 5,000-10,000 acres converted	Same as Alternative 1a, plus additional 10,000-15,000 acres converted	Same as Alternative 1a, plus additional 50,000-80,000 acres converted	Same as Alternative 1a, plus additional 5,000-10,000 acres converted	Same as Alternative 1a, plus additional 5,000-10,000 acres converted
Agricultural Water Use		Similar to Existing Conditions.	Potential changes due to efficiency and water quality BMPs.	Same as Alternative 1a, plus 2,500 AF of new water supply.	Same as Alternative 1a, plus about 1,000 AF of new water supply.	Same as Alternative 1c	Same as Alternative 2a	Same as Alternative 1c	Same as Alternative 1c	Same as Alternative 1c	Same as Alternative 1c
Agricultural Production Costs and Revenues		Similar to Existing Conditions.	Potential cost increases for BMPs. Potential yield and revenue increases from improved water quality.	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a
Risk and Uncertainty		Similar to Existing Conditions.	Reduced risk of levee failure and flooding. Higher costs can increase financial risk.	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a	Same as Alternative 1a

Table 5. Summary of Impacts for the Delta Region

use efficiency requires costs at both the farm and district levels. Greater capital investment and energy use is generally required to deliver and apply water more precisely and on demand. Some evidence exists that yields can improve with more careful and efficient water management. Costs for water and other production inputs can also change. The impact of the Water Use Efficiency Program is uncertain, and could range from little or no measurable effect to significant reductions in applied water. Based on preliminary estimates prepared for the CALFED Program, costs of achieving efficiency increases could range from $40 to $60 per AF of reduced applied water. Because virtually all applied water losses are recoverable and reusable in the Sacramento River Region, no net savings in consumptive use or irrecoverable loss (i.e., "real" water savings) are likely. Additional district-level costs could range from $5 to $12 per acre of land served.

The **Levee System Integrity Program** would have minor or indirect impacts in the Sacramento River Region.

Alternative 1B impacts would be similar to those described for 1A, except for potential cost.

Alternative 1C could provide an average of up to 35,000 AF of additional supply to Sacramento River Region users. Table 4 summarizes the estimates of yields provided for different alternatives, based on available preliminary hydrologic analysis. Delivery areas for this water would be primarily CVP service areas. Based on previous studies, it is expected that this water would be used to support production on lands idled due to supply restrictions of the CVPIA, the Bay-Delta Accord, and Biological Opinions. Some of this water could also support acreage shifted out of the Delta Region due to land conversion.

Some agricultural lands could be affected by the location of storage and conveyance facilities. The likely location of large storage facilities is in foothill or mountain areas, where land use is likely to be non-irrigated grazing.

The willingness of agricultural users to purchase water provided from storage components will depend on its cost, which is undetermined at this time. Based on recent payment capacity analysis by the U.S. Bureau of Reclamation, it is unlikely that Sacramento River Region CVP users would be willing to pay the cost for new water. If the cost of water provided is greater than agriculture's willingness to pay, impacts of

Alternative 1C would be similar to those described for Alternatives 1A and 1B.

Alternative 2

Impacts of the common programs would be similar to those described under Alternative 1.

Changes in water available for delivery due to Storage and Conveyance Components are shown in Table 4, and range from an average of 10,000 AF/yr in Alternatives 2A and 2C to about 35,000 AF/yr in Alternatives 2B and 2E. The delivery areas and the nature of impacts would be similar to those described under Alternative 1C. Some of this water could support acreage shifted out of the Delta Region due to land conversion. If the cost of water provided is greater than agriculture's willingness to pay, impacts of Alternative 2 in this region would be similar to those described for Alternatives 1A and 1B.

Alternative 3

Impacts for all configurations would be similar in direction to those described under Alternatives 1 and 2. Alternatives 3B and 3D-I would provide much larger increases in

supply during critical years, improving the overall reliability of supply. If the cost of water provided is greater than agriculture's willingness to pay, impacts of Alternative 3 in this region would be similar to those described for Alternatives 1A and 1B.

Impacts in the Sacramento River Region are summarized in Table 6.

5.2.3 San Joaquin River Region

Alternative 1

Alternative 1A includes only the common program components.

The **Ecosystem Restoration Program** includes purchase and conversion of agricultural lands for habitat restoration, some of it in the San Joaquin River Region. In addition, water will be acquired from existing users to augment river flow and Delta outflow. Some portion of this water will come from agricultural users in the San Joaquin River Region. Assuming that water acquired would not be replaced with groundwater pumping, the total effect of these components could be the conversion or idling of up to 50,000 acres of agricultural land, primarily lands east of the San Joaquin River. Cotton and other row crops, orchards, vineyards, pasture, and hay are all potentially affected. According to analysis done for the CVPIA Programmatic EIS, overall acreage of orchards, vineyards, and vegetable crops are less affected by water or land purchase. Pasture, hay, rice, cotton, and other field crops are more likely to be affected.

The **Water Quality Program** may implement BMPs that regulate the quantity or quality of discharged drainage from agricultural lands. Impacts will vary depending on the structure of the control program (e.g., whether BMPs are required versus advisory, or whether financial incentives such as cost-sharing and technical assistance are provided). BMPs could include practices such as reuse of surface drain water, percolation and subsurface drainage control, recycling, treatment, and controlled discharge of drainage. Costs of implementing BMPs are unknown at this time. Depending on costs and options for cost-sharing, the impacts on agricultural production costs in the San Joaquin River Region are potentially significant.

Potential impacts of the **Water Use Efficiency Program** on agriculture in the region are difficult to assess because they depend on the details of Program implementation, which will largely occur at the local level.

Achieving higher agricultural water use efficiency requires costs at both the farm and district levels. Greater capital investment and energy use is generally required to deliver and apply water more precisely and on demand. Some evidence exists that yields can improve with more careful and efficient water management. Costs for water and other production inputs can also change. The impact of the Water Use Efficiency Program is uncertain and could range from little or no measurable effect to significant reductions in applied water. Based on preliminary estimates prepared for the CALFED Program, costs of achieving efficiency increases could range from $50 to $100 per AF of reduced applied water, but over $500 per AF of net savings in consump-tive use or irrecoverable loss (i.e., "real" water savings). Additional district-level costs could range from $5 to $12 per acre of land served.

The **Levee System Integrity Program** would reduce the risk of salinity intrusion due to Delta levee failure. This is a benefit to those areas receiving irrigation water from the Delta export pumps.

Assessment Variable	Existing Conditions	Alternatives							
			Alternative 1		Alternative 2			Alternative 3	
		No Action	1a, 1b	1c	2a, 2c	2b, 2e	2d	3a, 3c	3b, 3d-3i
Irrigated Acres		Aggregate shift toward orchards and vegetables in response to consumer demands.	Up to 50,000 crop acres converted for habitat uses.	Same as Alternative 1a. Potential loss of some land for storage and conveyance facilities.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.
Agricultural Water Use		Reduction in CVP supply partly replaced with groundwater.	Potential changes due to water use efficiency and water quality BMPs.	Same as Alternative 1a. Also, up to 35,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 10,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 35,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 18,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 15,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 37,000 AF of additional average water supply.
Agricultural Production Costs and Revenues		Higher CVP water costs and groundwater pumping costs. Increased revenue due to crop shifts.	Potential cost increases for water use efficiency and water quality BMPs.	Potential cost increases for BMPs. New water supply can support increased production, but is potentially very costly.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.
Risk and Uncertainty		Similar to Existing Conditions.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.

Table 6. Summary of Impacts for the Sacramento River Region

Alternative 1B impacts would be similar to those described for Alternative 1A, except for potential cost.

Alternative 1C would provide an average of up to 167,000 AF of additional supply to San Joaquin Valley users. **Table 4** summarizes the estimates of yields provided for different alternatives to different regions, based on available preliminary hydrologic analysis. Delivery areas for this water would be the Delta-Mendota and San Luis service areas of the CVP and the Tulare Lake and Kern County regions of SWP delivery. Based on previous studies, it is expected that this water would be used partly to reduce annual groundwater overdraft and partly to support production on lands idled due to supply restrictions of the CVPIA, the Bay-Delta Accord, and Biological Opinions. Some of this water could also support acreage shifted out of the Delta Region due to land conversion.

Up to one-third of the yield from the storage components of Alternative 1C would be used to provide water for instream flow. Depending on the location of the storage, some of this water could reduce the need to purchase water from agricultural users in the San Joaquin River Region.

The willingness of agricultural users to purchase water provided from storage components will depend on its cost, which is undetermined at this time. If the cost of water provided is greater than agriculture's willingness to pay, impacts of Alternative 1C would be similar to those described for Alternatives 1A and 1B.

Agriculture in the San Joaquin Valley has faced an extended period of long-term uncertainty associated with water allocations as a result of Biological Opinions, water quality concerns, and the CVPIA. To the extent that the common programs can resolve many of the environmental concerns and reduce the threat of future regulatory action, long-term water supply uncertainty will be reduced.

The concept of adaptive management implies that long-term or short-term export and delivery rules may change over time as new information is obtained. Changes can increase or decrease total water deliveries, but the possibility of rule changes imposes uncertainty. It is possible that this uncertainty would be less than that faced by agricultural water users under existing conditions or No Action conditions.

Alternative 2

Impacts of the common programs would be similar to those described under Alternative 1.

Changes in water available for delivery due to Storage and Conveyance components are shown in **Table 4**, and range from an average of 48,000 AF/yr in Alternatives 2A and 2C to about 167,000 AF/yr in Alternatives 2B and 2E. The delivery areas and the nature of impacts would be similar to those described under Alternative 1C. Some of this water could support acreage shifted out of the Delta Region due to land conversion. If the cost of water provided is greater than agri-culture's willingness to pay, impacts of Alternative 2 in the San Joaquin River Region would be similar to those described for Alternatives 1A and 1B.

Alternative 3

Impacts for all configurations would be similar in direction to those described under Alternatives 1 and 2. The scale of water supply impacts could be slightly larger on average, ranging up to 177,000 AF/yr. Alternatives 3B and 3D-I would provide much larger increases in supply during critical years, improving the overall reliability of supply.

The willingness to purchase water available under all alternatives depends on its cost, which is undetermined at this time. If the cost of water provided is greater than agriculture's willingness to pay, impacts of Alternative 3 in the San Joaquin River Region would be similar to those described for Alternatives 1A and 1B.

Impacts in the San Joaquin Valley Region are summarized in Table 7.

5.2.4 Bay Region

Alternative 1

Impacts in Alternatives 1A and 1B from the **Ecosystem Restoration Program** on agriculture in the Bay Area are expected to be minor. To the extent that they apply to areas non-tributary to the Delta, impacts from the **Water Quality** and **Water Use Efficiency Programs** are expected to be similar to those described for the San Joaquin River Region. Salinity intrusion benefits of the **Levee System Integrity Program** would also be felt in this region. Because of water supply deficiencies in some agricultural areas, especially the San Felipe Division of the CVP, water transfers may be an important source of water in the future. How CALFED actions may affect transfers is unclear at this time.

Up to about 3,000 AF/yr could be available from the Storage and Conveyance components of Alternative 1C. This water could be available primarily to CCWD, San Felipe Division lands in the South Bay Area, and users served by the North and South Bay aqueducts of the SWP. If the cost of water provided is greater than agriculture's willing-ness to pay, impacts of Alternative 1C in the San Joaquin River Region would be similar to those described for Alternatives 1A and 1B.

Alternative 2

Impacts from Alternative 2 Storage and Conveyance components would range from 1,000 to 3,000 AF/yr, with impacts similar to those described for Alternative 1C.

Alternative 3

Impacts from Alternative 3 Storage and Conveyance components would range from 1,500 to 3,500 AF/yr, with impacts similar to those described for Alternative 1C.

Impacts in the Bay Region are summarized in Table 8.

5.2.5 Other SWP Service Areas

Alternative 1

Impacts in Alternatives 1A and 1B from the **Ecosystem Restoration Program** on agriculture in SWP areas outside the Central Valley are expected to be minor. Delta Region land conversion may cause some shifting of production to areas within Southern California that have low water cost, such as Imperial Valley. To the extent that they apply to areas non-tributary to the Delta, impacts from the **Water Quality** and **Water Use Efficiency Programs** are expected to be similar to those described for the San Joaquin River Region. Salinity intrusion benefits of the **Levee System Integrity Program** would also be felt in this region. Water transfers may be an important source of water in the future, but it is not clear how CALFED actions may affect transfers.

Additional water will be available to SWP contractors in the South Coast and Central Coast areas. However, it is unlikely that a significant amount of this water would be delivered for irrigation use.

Assessment Variable	Existing Conditions	Alternatives							
			Alternative 1		Alternative 2			Alternative 3	
		No Action	1a, 1b	1c	2a, 2c	2b, 2e	2d	3a, 3c	3b, 3d-3i
Irrigated Acres		Aggregate shift toward orchards and vegetables in response to consumer demands.	Up to 50,000 crop acres converted for habitat uses, primarily on east side.	Same as Alternative 1a. Potential loss of some land for storage and conveyance facilities.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.
Agricultural Water Use		Reduction in CVP supply partly replaced with groundwater.	Potential changes due to water use efficiency and water quality BMPs.	Same as Alternative 1a. Also, up to 167,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 48,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 167,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 86,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 73,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 177,000 AF of additional average water supply.
Agricultural Production Costs and Revenues		Higher CVP water costs and groundwater pumping costs. Increased revenue due to crop shifts.	Potential cost increases for water use efficiency and water quality BMPs.	Potential cost increases for BMPs. New water supply can support increased production, but is potentially very costly.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.
Risk and Uncertainty		Similar to Existing Conditions.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty. Reduced risk of salinity intrusion into Delta export supplies.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.

Table 7. Summary of Impacts for the San Joaquin River Region

Assessment Variable	Existing Conditions	Alternatives						
			Alternative 1		Alternative 2		Alternative 3	
		No Action	1a, 1b	1c	2a, 2c, 2d	2b, 2e	3a, 3c	3b, 3d-3i
Irrigated Acres		Reduced acreage in CVP supply areas.	Similar to No Action, with minor potential shift of crop production from Delta Region	Additional water can supply some of the acreage lost to CVP cuts.	Additional water can supply some of the acreage lost to CVP cuts.	Additional water can supply some of the acreage lost to CVP cuts.	Additional water can supply some of the acreage lost to CVP cuts.	Additional water can supply some of the acreage lost to CVP cuts.
Agricultural Water Use		Reduction in CVP supply.	Potential changes due to water use efficiency and water quality BMPs.	Same as Alternative 1a. Also, up to 3,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 1,700 AF of additional average water supply.	Same as Alternative 1a. Also, up to 3,000 AF of additional average water supply.	Same as Alternative 1a. Also, up to 1,400 AF of additional average water supply.	Same as Alternative 1a. Also, up to 3,500 AF of additional average water supply.
Agricultural Production Costs and Revenues		Similar to Existing Conditions, but higher CVP water cost.	Potential cost increases for water use efficiency and water quality BMPs.	Potential cost increases for BMPs. New water supply can support increased production, but is potentially very costly.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.	Same as Alternative 1c.
Risk and Uncertainty		Similar to Existing Conditions.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty. Reduced risk of salinity intrusion into Delta export supplies.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.	Same as Alternative 1a.

Table 8. Summary of Impacts for the Bay Region

Alternative 2

Impacts from Alternative 2 are expected to be similar to those described under Alternative 1.

Alternative 3

Impacts from Alternative 3 are expected to be similar to those described under Alternative 1.

Impacts in Other SWP Service Areas are summarized in Table 9.

5.3 Summary of Impacts by Region

Tables 10 through 13 provide a summary of impacts by region for each of the key assessment variables.

6.0 Related Topics

The assessment of impacts to agriculture is linked to several other resource categories. Potential changes in quantity and reliability of agricultural water supply are described in the Water Management Facilities and Operations Technical Report. Direct or indirect impacts on groundwater are evaluated in the Groundwater Hydrology Technical Report. Water quality impacts are described in the Water Quality Technical Report. Impacts on agricultural land use are also described in the Land Use Technical Report. Potential losses from flooding of agricultural lands are evaluated in the Flood Control Economics Technical Report. Impacts of changes in agricultural production on jobs, income, and the regional economy are described in the Regional Economics Technical Report.

7.0 References

California. Department of Water Resources. 1994. California Water Plan Update. Bulletin 160-93.

U.S. Department of Interior. Bureau of Reclamation, Mid-Pacific Region. 1997. Draft Programmatic Environmental Impact Statement for the Central Valley Project Improvement Act. September.

Assessment Variable	Existing Conditions	Alternatives			
		No Action	Alternative 1 1a, 1b, 1c	Alternative 2 2a-2e	Alternative 3 3a-3i
Irrigated Acres		Some conversion of land to urban use	Similar to No Action, with minor potential shift of crop production from Delta Region	Same as Alternative 1.	Same as Alternative 1.
Agricultural Water Use		Similar to Existing Conditions.	Potential changes due to water use efficiency and water quality BMPs.	Same as Alternative 1.	Same as Alternative 1.
Agricultural Production Costs and Revenues		Similar to Existing Conditions.	Potential cost increases for water use efficiency and water quality BMPs.	Same as Alternative 1.	Same as Alternative 1.
Risk and Uncertainty		Similar to Existing Conditions.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty. Reduced risk of salinity intrusion into Delta export supplies.	Same as Alternative 1.	Same as Alternative 1.

Table 9. Summary of Impacts for the Other SWP Service Areas

Alternative	Delta Region	Sacramento River Region	San Joaquin River Region	Bay Region	Other SWP Service Areas
1A, 1B	120,000-150,000 acres converted to other uses	Up to 50,000 crop acres converted for habitat uses.	Up to 50,000 crop acres converted for habitat uses, primarily on east side.	Similar to No Action, with minor potential shift of crop production from Delta Region	Similar to No Action, with minor potential shift of crop production from Delta Region
1C	Same as Alternative 1a	Same as 1a. Potential loss of some land for storage and conveyance facilities.	Same as 1a. Potential loss of some land for storage and conveyance facilities.	Additional water can supply some of the acreage lost to CVP cuts.	Same as Alternative 1a.
2A, 2C, 2D	Same as Alternative 1a, plus additional 2,000-10,000 acres converted	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.
2B, 2E	Same as 2a, except 2e could convert up to 20,000 acres for conveyance	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.
3A , 3C	Same as 1a, plus additional 5,000-10,000 acres converted	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.
3B, 3D, 3E, 3G	Same as 1a, plus additional 10,000-15,000 acres converted	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.
3F	Same as 1a, plus additional 50,000-80,000 acres converted	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.
3H, 3I	Same as 1a, plus additional 5,000-10,000 acres converted	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.

Table 10. Summary of Potential Impacts to Agricultural Land in Production

Alternative	Delta Region	Sacramento River Region	San Joaquin River Region	Bay Region	Other SWP Service Areas
1A, 1B	Potential changes due to efficiency and water quality BMPs.	Potential changes due to efficiency and water quality BMPs.	Potential changes due to efficiency and water quality BMPs.	Potential changes due to efficiency and water quality BMPs.	Potential changes due to efficiency and water quality BMPs.
1C	Same as Alternative 1a, plus 2,500 af of new water supply	Same as Alternative 1a. Also, up to 35,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 167,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 3,000 af of additional average water supply.	Same as Alternative 1a.
2A	Same as Alternative 1a, plus about 1,000 af of new water supply	Same as Alternative 1a. Also, up to 10,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 48,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 1,700 af of additional average water supply.	Same as Alternative 1a.
2B	Same as 1C.	Same as Alternative 1a. Also, up to 35,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 167,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 3,000 af of additional average water supply.	Same as Alternative 1a.
2C	Same as Alternative 1a, plus about 1,000 af of new water supply	Same as Alternative 1a. Also, up to 10,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 48,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 1,700 af of additional average water supply.	Same as Alternative 1a.
2D	Same as Alternative 1a, plus about 1,000 af of new water supply	Same as Alternative 1a. Also, up to 18,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 86,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 1,700 af of additional average water supply.	Same as Alternative 1a.
2E	Same as Alternative 1C.	Same as Alternative 1a. Also, up to 35,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 167,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 3,000 af of additional average water supply.	Same as Alternative 1a.
3A	Same as Alternative 2A	Same as Alternative 1a. Also, up to 15,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 73,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 1,400 af of additional average water supply.	Same as Alternative 1a.
3B	Same as 1C.	Same as Alternative 1a. Also, up to 37,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 177,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 3,500 af of additional average water supply.	Same as Alternative 1a.
3C	Same as 2A	Same as Alternative 1a. Also, up to 15,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 73,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 1,400 af of additional average water supply.	Same as Alternative 1a.
3D - 3I	Same as 1C.	Same as Alternative 1a. Also, up to 37,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 177,000 af of additional average water supply.	Same as Alternative 1a. Also, up to 3,500 af of additional average water supply.	Same as Alternative 1a.

Table 11. Summary of Potential Impacts to Agricultural Water Use

Alternative	Delta Region	Sacramento River Region	San Joaquin River Region	Bay Region	Other SWP Service Areas
1A, 1B	Potential cost increases for BMPs. Potential yield and revenue increases from improved water quality.	Potential cost increases for water use efficiency and water quality BMPs.	Potential cost increases for water use efficiency and water quality BMPs.	Potential cost increases for water use efficiency and water quality BMPs.	Potential cost increases for water use efficiency and water quality BMPs.
1C	Same as Alternative 1a.	Same as Alternative 1a. Also, new water supply can support increased production, but is potentially very costly.	Same as Alternative 1a. Also, new water supply can support increased production, but is potentially very costly.	Potential cost increases for BMPs. New water supply can support increased production, but is potentially very costly.	Same as Alternative 1a.
2A - 2E	Same as Alternative 1a.	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.
3A - 3I	Same as Alternative 1a.	Similar to Alternative 1c.	Similar to Alternative 1c.	Similar to Alternative 1c.	Same as Alternative 1a.

Table 12. Summary of Potential Impacts to Agricultural Revenues and Costs

Alternative	Delta Region	Sacramento River Region	San Joaquin River Region	Bay Region	Other SWP Service Areas
1A - 1C	Reduced risk of levee failure and flooding. Higher costs can increase financial risk.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty. Reduced risk of salinity intrusion into Delta export supplies.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty. Reduced risk of salinity intrusion into Delta export supplies.	Higher costs can increase financial risk. Potential reduction in regulatory uncertainty. Reduced risk of salinity intrusion into Delta export supplies.
2A - 2E	Similar to 1A.	Similar to 1A.	Similar to 1A.	Similar to 1A.	Similar to 1A.
3A - 3I	Similar to 1A.	Similar to 1A.	Similar to 1A.	Similar to 1A.	Similar to 1A.

Table 13. Summary of Potential Impacts to Risk and Uncertainty

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